

Echocardiography : modern evaluation of cardiac structure and function

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7. VALORISATION

Echocardiography has developed into an imaging technique that is indispensable in the current practice of cardiology. Research that covers all aspects of modern echocardiography continues to be highly relevant in a wide range of areas.

First, the performance of existing techniques such as the assessment of left ventricular ejection fraction using either visual assessment or the Simpson's biplane method has often been validated in relatively selected patient population. Therefore, it is important to assess the performance of these techniques also in larger populations that more closely resemble populations that are typically encountered in everyday clinical practice. The data presented in chapter 3 of this thesis show that conventional assessment of left ventricular ejection fraction is fraught with a considerable variability in an elderly heart failure population. The data also show that this can potentially have a significant impact on clinical decision making such as in whom to implant an ICD. These data are relevant on several levels. Of course, in the light of these data, research in echocardiography should be directed towards developing techniques for more reliable assessment of left ventricular ejection fraction that are applicable in everyday clinical practice. In addition, both cardiologists as well as internists caring for elderly heart failure patients need to be aware of the limitations when measuring left ventricular ejection fraction. These considerations are also relevant on a socio-economic level when considering the use of costly therapies such as ICDs.

Second, existing techniques can be used to assess the effect of interventions in specific patient populations. In chapter 5, we have used echocardiography to assess the effect of intensified heart failure therapy on left ventricular function. We show that, overall, intensification in heart failure therapy leads to a significant improvement in left ventricular ejection fraction, and that guidance of therapy with the use of the biomarker NT-pro-BNP has a positive impact on this improvement. These data are of interest to heart failure specialists, and will also be of value when designing future intervention trials in heart failure.

Third, novel software tools that assist in measuring cardiac dimensions on imaging datasets need to be validated in terms of their performance against a gold standard and in terms of ease of use. In chapter 4 we compare conventional methods and a novel software tool for measuring left atrial volumes against magnetic resonance imaging. We show that compared to magnetic resonance imaging, the novel software tool is more accurate but also more time-consuming. These data are relevant not only to cardiologists who need to interpret cardiac imaging studies, but also to engineers and software developers. In addition, this novel and more accurate tool could potentially be used in future studies that assess the prognostic value of left atrial size for example in patients with paroxysmal atrial fibrillation.

Fourth, in chapter 1 and chapter 6 we use novel technologies (myocardial contrast echocardiography for the assessment of myocardial perfusion, 3-dimensional speckle

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tracking for the measurement of left ventricular torsion) to assess (patho-)physiologic changes that occur during adaptation to high altitude. While at first glance high-altitude physiology might seem to be a minor health issue, it should be noted that (a) large populations in the Andes and Himalayas are living at high altitude, and (b) people increasingly travel to high altitudes. Thus, there is a growing interest in understanding the mechanisms of adaptation to high altitude both in healthy subjects and in subjects that are prone to develop high altitude. Thus, the data in chapters 1 and 6 are of interest to researchers and health care professionals dealing with people who intend to travel to high altitudes. In addition, understanding of the mechanisms of adaptation to high altitude with profound hypoxia may also shed light on the response of the human cardiocirculatory system to hypoxia during disease states at low altitude.

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